Student Journal Answers

Chapter 1

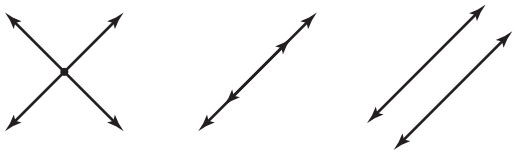
Maintaining Mathematical Proficiency

1. 4
2. 1
3. 2
4. 10
5. 4
6. 22
7. 9
8. 10
9. 11
10. 120 cm^2
11. 36 ft^2
12. 139.5 km^2
13. x and y can be any real number, $x \neq y$; $x = y$; no; Absolute value is never negative.

1.1 Explorations

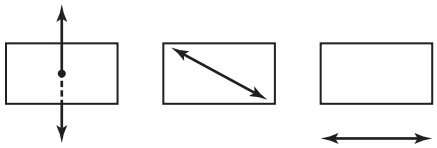
1. A line extends infinitely in each direction, a line segment has two endpoints, and a ray has one endpoint and extends infinitely in one direction.

2. a. Two lines can intersect at a point, overlap, or not intersect.



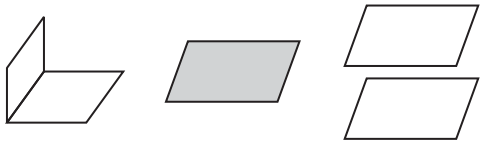
Sample answer: The line formed by the floor and front wall intersects the line formed by the front wall and side wall; The line formed by the bottom of the front wall overlaps the line formed by the front edge of the floor; The line formed by the front wall and the floor does not intersect the line formed by the side wall and back wall.

b. A line and a plane can intersect at a point, overlap, or not intersect.



Sample answer: A line formed by two walls intersects the floor at a point; A line formed by a wall and the floor overlaps the floor; A line formed by a wall and the floor does not intersect the ceiling.

c. Two planes can intersect in a line, overlap, or not intersect.



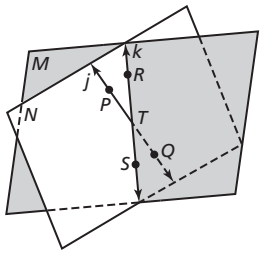
Sample answer: The floor and a wall intersect in a line; The door and the wall overlap; the floor and the ceiling do not intersect.

3. *Sample answer:* A segment bisector is a point, ray, line, line segment, or plane that intersects the segment at its midpoint.

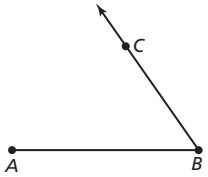
4. You can draw geometric shapes and figures and explore their characteristics.

1.1 Extra Practice

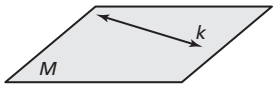
1. $\overleftrightarrow{DC}$, line m
2. *Sample answer:* plane ABE
3. A, C, B; *Sample answer:* E
4. D
5. $\overleftrightarrow{QP}$
6. $\overleftrightarrow{SR}$
7. $\overrightarrow{TP}$, $\overrightarrow{TS}$, $\overrightarrow{TR}$, $\overrightarrow{TQ}$; $\overrightarrow{TP}$ and $\overrightarrow{TQ}$ are opposite rays; $\overrightarrow{TR}$ and $\overrightarrow{TS}$ are opposite rays
8. *Sample answer:*



9. *Sample answer:*



10. *Sample answer:*



1.2 Explorations

1. a. Check students' work.
b. $4\frac{4}{5}$ paper clips; Sliding the paper clip end-to-end, the 6-inch segment is just less than 5 lengths of the paper clip.
c. $1\frac{1}{4}$; $\frac{4}{5}$
d. Use the pencil and straightedge to draw a segment longer than 6 inches. Starting at one end, measure about $4\frac{4}{5}$ paper clips. Mark the endpoint.

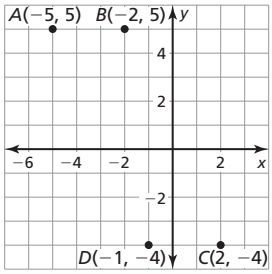
2. a. Check students' work.
b. about 5.8 in.
c. $2\frac{2}{5} \times 4$ paper clips
d. about 4.7 paper clips; yes; The Pythagorean Theorem states a relationship between lengths, regardless of how they are measured.

3. *Sample answer:* For a height of 60 inches, about 10.3 diags; Divide the height in inches by 5.8.

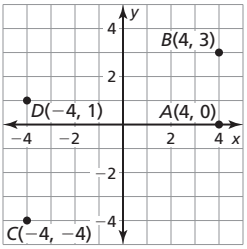
4. Use a ruler or a straightedge and a measuring tool.

1.2 Extra Practice

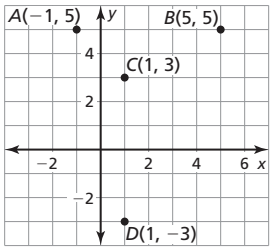
1. yes



2. no



3. yes



4. 23

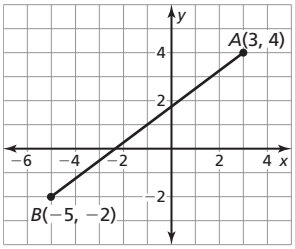
5. 12

6. 75

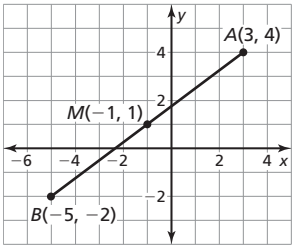
7. 3.5 km

1.3 Explorations

1. a.



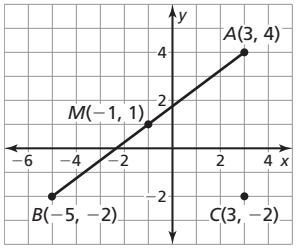
b. *Sample answer:* Fold the graph paper diagonally so that B is on top of A and both halves of $\overline{AB}$ overlap. Unfold the paper and label point M where the crease intersects $\overline{AB}$.



c. $(-1, 1)$

d. The x-coordinate of M is halfway between the x-coordinates of B and A. The y-coordinate of M is halfway between the y-coordinates of B and A. The x-coordinate of M equals the average of the x-coordinates of B and A. The y-coordinates of M equals the average of the y-coordinates of B and A.

2. a.



b. 10 cm

c. 10 cm

d. $AM = MB = 5$; *Sample answer:* The Pythagorean Theorem can be used to find the length of any line segment on the coordinate plane.

3. *Sample answer:* Find the averages of the x-coordinates and the y-coordinates; Use the Pythagorean Theorem.

4. a. $M(2, 1)$, $DE = 26$

b. $M\left(\frac{5}{2}, 4\right)$, $FG = \sqrt{233}$

1.3 Extra Practice

1. M; 26

2. $\overrightarrow{MC}$; 16

3. line ℓ; 52

4. $\overrightarrow{MT}$; 12

5. line m; 36

6. M; 16

7. $M(-2, 4)$

8. $M(4, 2)$

9. $M(6, -9)$

10. $K(-5, -6)$

11. $K(-5, 0)$

12. $K(-11, -2)$

1.4 Explorations

1. a. Check students' work.

b. 20 cm

c. yes; The slopes of $\overline{AB}$ and $\overline{CD}$ are $\frac{3}{4}$, and the slopes of $\overline{BC}$ and $\overline{AD}$ are $-\frac{4}{3}$. Because $\frac{3}{4}\left(-\frac{4}{3}\right) = -1$, the sides are perpendicular.

d. a quadrilateral with four congruent sides and four right angles; yes; $AB = BC = CD = DA = 5$, and all four angles are right angles; $A = 25$ cm^2

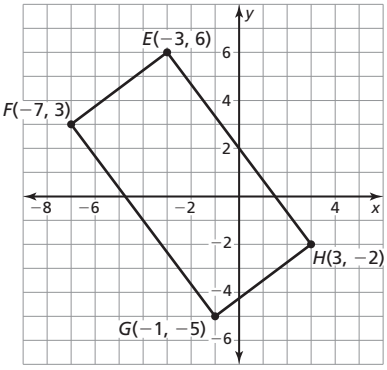
2. a. *BPA:* $B(-3, 1)$, $P(1, 1)$, $A(1, 4)$
AQD: $A(1, 4)$, $Q(1, 0)$, $D(4, 0)$
DRC: $D(4, 0)$, $R(0, 0)$, $C(0, -3)$
CSB: $C(0, -3)$, $S(0, 1)$, $B(-3, 1)$
PQRS: $P(1, 1)$, $Q(1, 0)$, $R(0, 0)$, $S(0, 1)$

b. 6 cm^2; 6 cm^2; 6 cm^2; 6 cm^2; 1 cm^2

c. yes; $6 + 6 + 6 + 6 + 1 = 25$ cm^2

3. Use the Distance Formula to find the lengths of the sides and add the lengths together. Use the appropriate area formula and the dimensions of the figure, or partition the figure into shapes that have easily determined areas and add the areas together.

4. a.



b. 30 cm

c. yes; The slopes of $\overline{EF}$ and $\overline{GH}$ are $\frac{3}{4}$, and the slopes of $\overline{FG}$ and $\overline{EH}$ are $-\frac{4}{3}$. Because $\frac{3}{4}\left(-\frac{4}{3}\right) = -1$, the sides are perpendicular.

d. a quadrilateral with four congruent sides and four right angles; no; All four sides are not congruent; $A = 50$ cm^2

1.4 Extra Practice

1. pentagon; concave
2. octagon; convex
3. octagon; concave
4. dodecagon; convex
5. 14.3 units, 6 square units
6. 12.2 units, 5 square units
7. 26 units, 30 square units
8. 12 units, 9 square units
9. 18.8 units
10. 16 units
11. 22.8 units
12. 15 square units
13. 12 square units
14. 27 square units

1.5 Explorations

1. a. 35°; acute

b. 65°; acute

c. 30°; acute

d. 110°; obtuse

e. 80°; acute

f. 45°; acute

g. 75°; acute

h. 145°; obtuse

2. a. Check students' work.

b. Check students' work.

c. yes; $180(6 - 2) = 180(4) = 720°$ and $120(6) = 720°$

d. 720°, 720°, 1080°; no; The first two hexagons split up angles in the hexagon, but the third hexagon adds six angles in the center of the hexagon.

3. Use a protractor; When the measure is greater than 0° and less than 90°, the angle is acute. When the measure is equal to 90°, the angle is right. When the measure is greater than 90° and less than 180°, the angle is obtuse. When the measure is equal to 180°, the angle is straight.

1.5 Extra Practice

1. $\angle EFG$; $\angle GFH$; $\angle EFH$
2. $\angle QRT$; $\angle TRS$; $\angle QRS$
3. $\angle LMN$; $\angle NMK$; $\angle LMK$
4. 116°
5. 22°
6. 100°, 80°
7. 18°, 72°
8. 46°, 46°
9. 70°, 140°

1.6 Explorations

1. a. $x°$ and $y°$ make a straight angle together; $y°$ and $z°$ make a straight angle together; $x°$ and $z°$ appear to be congruent.

b. 72°; 108°; 72°; 72°; 36°; $x = 180 - 108 = 72$; $y = 180 - 72 = 108$; $z = 180 - 108 = 72$; $w = 180 - 108 = 72$; $v = 180 - (72 + 72) = 36$

2. a. $a°$ and $b°$ make a right angle together, $c°$ and $d°$ make a straight angle together, $c°$ and $e°$ are congruent angles

b. 90°; 90°; 90°; $c = 180 - 90 = 90$; $d = 180 - c = 180 - 90 = 90$; $e = 180 - 90 = 90$

3. When two lines intersect, four angles and two pairs of opposite rays are formed. The angles that are next to each other have measures that add up to 180°. The angles that are across from each other are congruent and have the same measure.

4. Complementary angle measures add up to 90°; Supplementary angle measures add up to 180°; Vertical angles have the same measure.

1.6 Extra Practice

1. $\angle TOS$ and $\angle TOP$
2. $\angle LJM$ and $\angle TOP$; $\angle LJM$ and $\angle QOR$
3. 54°
4. 63°
5. $m\angle BAC = 42°$; $m\angle CAD = 48°$
6. $m\angle EFH = 55°$; $m\angle HFG = 125°$
7. $\angle 1$ and $\angle 2$; $\angle 1$ and $\angle 4$
8. $\angle 1$ and $\angle 3$; $\angle 2$ and $\angle 4$; $\angle 5$ and $\angle 8$; $\angle 6$ and $\angle 9$; $\angle 7$ and $\angle 10$
9. no; The noncommon sides of $\angle 6$ and $\angle 7$ are not opposite rays.

Chapter 2

Maintaining Mathematical Proficiency

1. $a_n = 6n - 1$; $a_{20} = 119$
2. $a_n = 12n + 10$; $a_{20} = 250$
3. $a_n = 13n - 26$; $a_{20} = 234$
4. $a_n = 0.5n - 5$; $a_{20} = 5$
5. $a_n = -15n + 55$; $a_{20} = -245$
6. $a_n = n - \frac{3}{2}$; $a_{20} = \frac{37}{2}$, or $18\frac{1}{2}$
7. $x = 3y + 4$
8. $x = 4y - 10$
9. $x = 5y - 2$
10. $x = -\frac{1}{9}y + 2$
11. $x = \dfrac{10y - 1}{3z + 2}$
12. $x = \dfrac{7z}{2y + 1}$

2.1 Explorations

1. a. true; Thursday always follows Wednesday.

b. false; 30° is only one example of an acute angle.

c. false; June is only one of the months that has 30 days.

d. true; All even numbers are divisible by 2 and 9 is not a perfect cube. Because both the hypothesis and conclusion are false, the conditional statement is true.

2. a. true; $\overline{AB}$ is a vertical segment, and $\overline{BC}$ is a horizontal segment. So, they are perpendicular.

b. false; $\overline{BC}$ is longer than the other two sides.

c. true; $BD = CD$ because both have endpoints that are the same distance from the origin.

d. true; $\overline{AD} \parallel \overline{BC}$ because they are both horizontal segments.

e. false; $\overline{AB}$ is vertical, but $\overline{CD}$ is not. So, they are not parallel.

3. a. true; The Pythagorean Theorem is valid for all right triangles.

b. false; Two angles are complementary when the sum of their measures is 90°.

c. false; The sum of the angle measures of a quadrilateral is always 360°.

d. true; This is the definition of collinear.

e. true; Every pair of intersecting lines forms two pairs of opposite rays and therefore two pairs of vertical angles.

4. A conditional statement is only false when a true hypothesis produces a false conclusion. Otherwise, it is true.

5. *Sample answer:* If the measure of an angle is greater than 0° and less than 90°, then it is an acute angle; If polygon $ABCD$ is a trapezoid, then it is a rectangle; The first statement is true because it is the definition of an acute angle. The second statement is false because trapezoids only have one pair of parallel sides, but rectangles have two pairs of parallel sides.